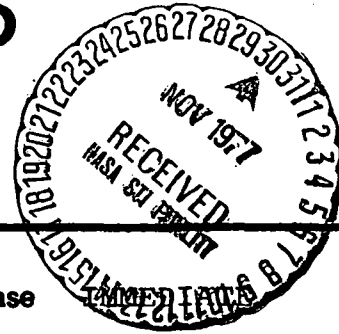


P77-10229

NASA News

National Aeronautics and
Space Administration

Washington, D.C. 20546
AC 202 755-8370



For Release

Press Kit

Project Meteosat

RELEASE NO: 77-230

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Mailed:
November 7, 1977

(NASA-News-Release-77-230) NASA TO LAUNCH
METEOSAT IN WORLDWIDE WEATHER STUDY
(National Aeronautics and Space
Administration) 17 p

N78-70071

Unclas
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NASA News

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Space Administration

Washington, D.C. 20546
AC 202 755-8370

For Release:

Dick McCormack
Headquarters, Washington, D.C.
(Phone: 202/755-8583)

IMMEDIATE

James Lacy
Goddard Space Flight Center, Greenbelt, Md.
(Phone: 301/982-4955)

RELEASE NO: 77-230

NASA TO LAUNCH METEOSAT IN WORLDWIDE WEATHER STUDY

The European Space Agency's (ESA's) Meteosat is scheduled to be launched no earlier than Nov. 17 from Cape Canaveral, Fla., by NASA's Delta 2914 rocket. The weather satellite will become a part of a worldwide meteorological program employing as many as five geostationary satellites. Launch window is from 8:35 to 9:05 p.m. EST. The satellite's final Earth synchronous orbital position will be latitude 0, longitude 0, placing it over the western coast of South Africa.

-more-

Meteosat will be one of the first practical applications of European space research and technology. Eight of ESA's 10 member countries are participating: Belgium, Denmark, France, Germany, Italy, Sweden, Switzerland and the United Kingdom.

The five spacecraft comprising the worldwide program will be placed at equal distances around the globe and will transmit cloud cover images to ground stations for processing and relay to users. Meteorological data collected from platforms, buoys and low polar orbiting satellites will also be collected. This system will be an important element of the Global Weather Experiment (GWE), a part of the Global Atmospheric Research Program (GARP).

Additionally, the U.S. and the Soviet Union plan to launch two satellites each into polar orbit. The mission of these satellites is to:

- Collect and disseminate observation data on cloud formations and Earth surface temperatures.
- Collect and disseminate meteorological observations data from ships, buoys and unmanned observatories.
- Observe solar protons by space environment monitor.

In addition to those countries participating in the satellite portion of GWE, approximately 145 countries also will make contributions to the worldwide weather effort by taking daily surface and atmospheric measurements in their respective areas.

All of the data will be sent to Central Data Centers in Moscow and Washington, D.C. Current planning calls for the program to be ready for the first intensive observation period by December of 1978.

The global system of precisely placed satellites in geostationary orbit will extend the presently limited amount of meteorological data European scientists receive from U.S. spacecraft designed to provide information for one or two day forecasts of weather conditions in the United States. Since climatic conditions in one part of the world can affect the weather many thousands of kilometers away, the continuous observation of all the Earth's surface and cloud cover by the global system will produce for Europe, or any other region, accurate weather forecasts for more than just a couple of days.

The potential value of advanced, accurate weather forecasts to agriculture, forestry, fishing, transportation, tourist and construction industries is of tremendous value.

Severe storm warnings or other weather extremes as well as favorable forecasts for leisure and work can affect the lives of people throughout the world.

Meteosat observes the Earth and its cloud cover in both the visible light and infrared regions. A high resolution radiometer achieves a definition of 2.5 kilometers (1.6 miles) on the ground in daylight; 5 km (3.1 mi.) in the infrared. Images are composed of 2,500 lines in the infrared, 5,000 lines in the visible light channel. A line-by-line scan picture is taken every 30 minutes. Line scanning is achieved by the satellite's rotation at approximate 100 rpm. Line-to-line shifting is obtained by tipping the telescope.

Unprocessed images received directly from Meteosat are of sufficient quality to be of immediate use. For more precise definition compatible with international Automatic Picture Transmission (APT) and Weather Facsimile (WEFAX) standards, the raw picture is processed by computer on the ground and sent back to the satellite for retransmission to weather stations. WEFAX transmissions can be sent for the complete coverage with lower resolution, or with high resolution for a limited zone. Two transmission channels are devoted to WEFAX.

Images will be utilized in a variety of ways. Infrared images will help determine Earth surface and cloud temperatures with a precision of 1 degree Celsius (33.8 Fahrenheit). Cloud height can be deduced from these temperatures. Wind velocity, especially in the tropics, may be determined with 3 meters-per-second precision from the observed movement of small clouds.

Data will be collected from the interrogation of Earth stations, buoys at sea and weather balloons. Meteosat has a data retransmission capability. It will send to processing sites data collected by satellites in low polar orbit such as those taking vertical soundings of atmospheric temperatures obtained by a multispectral infrared radiometer.

This system's flexibility makes data acquired by Meteosat available, through its sister spacecraft in the global network, to meteorologists, oceanographers, hydrologists and other Earth scientists thus contributing significant improvements in weather forecasting.

Although Meteosat's most obvious, even spectacular, potential is that of saving human lives and limiting property damage by early warning of hurricanes or severe storms, its contributions will also be felt in agriculture, fishing and all industries where weather and climate are related.

Meteosat is 2.10 meters (7 feet) in diameter, 3.195 m (10.4 ft.) in height excluding the apogee boost motor (ABM) and weighs 697 kilograms (1,535 pounds) including the 345 kg (760 lb.) ABM and fittings.

Data Acquisition, Telecommand and Tracking Station (DATTS) will be the telecommunication terminal for the main S-band up/down links with the satellite. Located at Odenwald (near Darmstadt) Germany, DATTS will be linked to three facilities of the European Space Operations Center (ESOC) at Darmstadt. These are:

MOCC (Meteosat Operations Control Center) which controls the entire system and coordination of operations.

DRCC (Data Referencing and Conditioning Center) for general data handling and processing.

MIEC (Meteorological Information Extraction Center) for reception and display of full resolution digital pictures or WEFAX data.

NASA's Space Tracking and Data Network (STDN) has full telemetry and command support responsibility for the Meteosat mission from pre-launch activities through a portion of the drift-orbit phase, until the spacecraft comes into view of the dedicated ESA ground station.

At that time, ESA assumes full mission responsibility and NASA STDN support terminates. The Ascension Island STDN will, however, provide emergency backup command support.

STDN station activities are coordinated between Goddard's Network Operations Control Center, Greenbelt, Md., and ESOC Darmstadt, in accordance with previously established NASA and ESA interface agreements.

The prime STDN Meteosat support stations are Orroral Valley, Australia, and Guam (Pacific) for the first apogee and all subsequent odd-numbered apogees. Santiago, Chile, and Rosman, N.C., sites are the prime sites for the second apogee and all subsequent even-numbered apogees.

During the 24 hour period following the apogee motor firing, continuous tracking is provided by the in-view STDN sites. Continuous telemetry and command support from one station is provided from apogee motor firing plus three hours until acquisition by an ESA ground station. Support thereafter is limited to occasional coverage by one station (on demand).

The Cannes Establishment of Aerospatiale is prime contractor for the development of Meteosat, heading the Cosmos Consortium which includes:

AEROSPATIALE (Societe' Nationale Industrielle Aero-
spatiale, France)

CASA (Constructiones Aeronautics S.A., Spain)

ETCA (Etudes Techniques et Constructions Aeronautiques,
Belgium)

MBB (Messerschmitt-Bolkow-Blohm, Germany)

MSDS (Marconi Space and Defence Systems, Ltd..
United Kingdom)

SAT (Societe Anonyme de Telecommunications, France)

SELENIA Spa (Italy)

Siemens AG (Germany)

Additionally, the Cannes Establishment of Aerospatiale is responsible for project management, systems studies, integration and testing.

(END OF GENERAL RELEASE. BACKGROUND INFORMATION FOLLOWS.)

METEOSAT LAUNCH PROFILE

The first two stages of the Delta 2914 place the spacecraft into a low altitude parking orbit 185 km (115 mi.) near the first equatorial crossing. Spinup to 100 rpm, followed by injection into a transfer orbit using the Delta third stage, occurs after a few minutes in parking orbit.

If spacecraft operation is normal Meteosat will be boosted into synchronous orbit when the apogee motor is fired at the first apogee (approximately 27 hours after liftoff). For a nominal transfer orbit, the subsatellite longitude at this time is 91 degrees E.

Following burnout of the Delta third stage and spacecraft separation, Meteosat will be in transfer orbit. Transfer orbit is a highly elliptical inclined orbit with a perigee altitude of 185 km (115 mi.) and an apogee of 1,200 km (745 mi.) above synchronous altitude. When the spacecraft motor is fired at apogee in a precise orientation, the orbit will be circularized and the launch inclination removed.

During transfer orbit the spacecraft with apogee motor attached is unstable about its principal (spin) axis. To minimize nutation buildup about this spin axis, an active nutation control system is activated when the spacecraft separates from the Delta third stage. Precise control of thruster firings by this active nutation control system maintains spacecraft stability about the spin axis.

Prior to apogee motor firing, the spacecraft spin axis must be reoriented to the correct attitude. This reorientation will be started as soon as possible after determination of injection attitude and subsequent apogee motor firing attitude. The apogee motor firing attitude will be aligned to inject the spacecraft into near-synchronous drift orbit for arrival on station in less than two weeks.

DELTA LAUNCH VEHICLE

First Stage

The first stage is a McDonnell Douglas modified Thor booster incorporating nine Castor II strap-on Thiokol solid fuel rocket motors. The booster is powered by a Rocketdyne engine using liquid oxygen and liquid hydrocarbon propellants. The main engine is gimbal-mounted to provide pitch and yaw control from liftoff to main engine cutoff (MECO).

Second Stage

The second stage is powered by a TRW liquid-fuel, pressure-fed engine that also is gimbal-mounted to provide pitch and yaw control during coast and after second stage cutoffs. Two fixed nozzles, fed by the propellant tank, helium pressurization system, provide retrothrust after third stage separation. Fifty-six minutes after spacecraft separation, the second stage will be reignited for a 12 second burn. Data on this burn will be collected for studies related to future Delta missions.

Third Stage

The third stage is the TE-364-4 spin-stabilized, solid propellant Thiokol motor. It is secured in the spin table mounted to the second stage. The firing of eight solid propellant rockets fixed to the spin table accomplishes spin-up of the third stage spacecraft assembly.

Injection Into Synchronous Orbit

The Delta vehicle will inject Meteosat into a transfer orbit having an apogee of 36,999 km (22,990 mi.), a perigee of 185 km (115 mi.) and an inclination of 27.5 degrees. NASA's Spaceflight Tracking and Data Network will provide telemetry, tracking and ranging support until the spacecraft is placed in its final synchronous orbit at 0 degrees E. longitude. Command, control, tracking and data analysis are the responsibilities of the European Space Operations Center (ESOC).

STRAIGHT EIGHT DELTA FACTS AND FIGURES

Height: 35.4 m (116 ft.) including shroud
Maximum Diameter: 2.4 m (8 ft.) without attached solids
Liftoff Weight: 131,895 kg (293,100 lb.)
Liftoff Thrust: 1,765,315 newtons (396,700 lb.)
 including strap-on solids

First Stage

(Liquid only) consists of an extended long-tank Thor produced by McDonnell Douglas. The RS-27 engines are produced by the Rocketdyne Division of Rockwell International. The stage has the following characteristics:

Diameter: 2.4 m (8 ft.)
Height: 21.3 m (70 ft.)
Propellants: RJ-1 kerosene as the fuel and liquid oxygen (LOX) as the oxidizer
Thrust: 912,000 N (205,000 lb.)
Burning Time: About 3.48 minutes
Weight: About 84,600 kg (186,000 lb.) excluding strap-on solids

Strap-on solids consist of nine solid-propellant rockets produced by the Thiokol Chemical Corp. with the following features:

Diameter: 0.8 m (31 in.)
Height: 7 m (23.5 ft.)
Total Weight: 40,300 kg (88,650 lb.) for nine
 4,475 kg (9,850 lb.) for each
Thrust: 2,083,000 N (468,000 lb.) for nine
 231,400 N (52,000 lb.) for each
Burning Time: 38 seconds

Second Stage

Produced by McDonnell Douglas Astronautics Co., using a TRW TR-201 rocket engine; major contractors for the vehicle inertial guidance system located on the second stage are Hamilton Standard, Teledyne and Delco.

Propellants: Liquid, consists of Aerozene 50 for the fuel and nitrogen tetroxide (N_2O_4) for the oxidizer.

Diameter: 1.5 m (5 ft.) plus 2.4 m (8 ft.) attached ring

Height: 6.4 m (21 ft.)

Weight: 6,118 kg (13,596 lb.)

Thrust: About 42,943 N (9,650 lb.)

Total Burning Time: 335 seconds

Third Stage

Thiokol Chemical Co. TE-364-4 motor.

Propellant: Solid

Height: 1.4 m (4.5 ft.)

Diameter: 1 m (3 ft.)

Weight: 1,152 kg (2,560 lb.)

Thrust: 61,855 N (13,900 lb.)

Burning Time: 44 seconds

LAUNCH OPERATIONS

The Kennedy Space Center's Expendable Vehicles Directorate plays a key role in the preparation and launch of the thrust-augmented Delta rocket carrying the Meteosat spacecraft.

Delta 136 will be launched from Pad A, northernmost of the two launch pads at Complex 17, Cape Canaveral Air Force Station.

The Delta first stage and interstage were erected on Pad A Oct. 3. Nine Castor II solid strap-on rocket motors were mounted in place around the base of the first stage Oct. 4-5. The second stage was mated with the first stage Oct. 6.

One of the nine Castor II solid motors was removed Oct. 19 and taken to the Redstone Arsenal in Huntsville, Ala., for a test firing Oct. 20. The successful test of that solid motor and another motor which would have been flown on Delta 137 with a Japanese communications satellite in December cleared the way for the successful launch of Delta 135 with International Sun Earth Explorers 1 and 2 by Kennedy Center Oct. 22. It was replaced Oct. 28.

The Meteosat spacecraft was received at Kennedy Center Sept. 19. After its initial checkout in Hangar AE, it was moved to the Spin Test Facility Oct. 31. Movement of the spacecraft/third stage assembly to the pad for mating with Delta 136 is scheduled for Nov. 10.

Based upon a Nov. 17 launch date, the payload fairing which protects the spacecraft on its flight through the atmosphere is to be put in place Nov. 15.

TYPICAL LAUNCH SEQUENCE FOR METEOSAT/DELTA 136

Event	Time	Altitude Nautical Miles	Velocity Ft./Sec.
Liftoff	0 sec.	0	0
Six Solid Motor Burnout	38 sec.	19,156 ft.	2,218
Three Solid Motor Ignition	39 sec.	22,054 ft.	2,219
Three Solid Motor Burnout	1 min. 17 sec.	69,337 ft.	3,795
Nine Solid Motor Jettison	1 min. 27 sec.	13.8 mi.	4,089
Main Engine Cutoff (MECO)	3 min. 48 sec.	50.2	17,610
First/Second Stage Separation	3 min. 56 sec.	53.2	17,635
Second Stage Ignition	4 min. 1 sec.	55.0	17,615
Fairing Jettison	4 min. 42 sec.	67.8	18,245
Second Stage Cutoff (SECO-I)	8 min. 58 sec.	86.1	25,802
Restart Second Stage	21 min. 46 sec.	95.7	25,726
Second Stage Cutoff (SECO-II)	21 min. 53 sec.	95.9	26,002
Third Stage Spinup	22 min. 43 sec.	97.7	25,990
Second/Third Stage Separation	22 min. 45 sec.	97.8	25,989
Third Stage Ignition	23 min. 26 sec.	99.6	25,977
Third Stage Burnout	24 min. 10 sec.	102.9	33,693
Third Stage/Spacecraft Separation	25 min. 23 sec.	123	33,582

DELTA 136/METEOSAT TEAM

European Space Agency

Roy Gibson	Director General
Dr. Ernst Trendelenberg	Director of Scientific and Meteorological Programs
Dr. Dieter Lennertz	Meteorological Program Manager
David Leverington	Spacecraft Manager
Claude Honbault	Ground Segment Manager

NASA Headquarters

John F. Yardley	Associate Administrator for Space Flight
Joseph B. Mahon	Director of Expendable Launch Vehicle Programs
Peter T. Eaton	Manager, Delta Programs

Goddard Space Flight Center

Dr. Robert S. Cooper	Director
Robert E. Smylie	Deputy Director
Robert Lindley	Director of Projects
Robert Baumann	Associate Director Space Transportation Systems
David W. Grimes	Delta Project Manager
William R. Russell	Deputy Delta Project Manager, Technical
John Langmead	Deputy Project Manager, Resources
Robert Goss	Chief, Mission Analysis and Integration Branch, Delta Project Office

Goddard Center (cont'd.)

Frank J. Lawrence	Delta Mission Integration Manager
Richard H. Scalafford	Mission Operations and Network Support Manager
Ray Mazur	Mission Support

Kennedy Space Center

Lee R. Scherer	Director
Gerald D. Griffin	Deputy Director
Dr. Walter J. Kapryan	Director, Space Vehicles Operations
George F. Page	Director, Expendable Vehicles
W. C. Thacker	Chief, Delta Operations Division
Bert L. Grenville	Chief, Delta Operations Branch
Gayle Hager	Spacecraft Coordinator

CONTRACTORS

McDonnell Douglas Astronautics Co. Huntington Beach, Calif.	Delta launch vehicle
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Meteosat Prime Contractors

Aerospatiale, France

MATRA

ETCA, Belgium

MBB, Germany

MSDS, United Kingdom

Selenia, Italy

Siemens, Germany